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Original Research Article **Pharmacy Practice**

Evaluation of Prescribing Pattern of Drugs Used in Diabetes Mellitus with Cardiovascular Diseases in a Tertiary Care Hospital

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Abstract

To study the prescribing pattern of drugs used in Diabetes mellitus with cardiovascular diseases in a tertiary care hospital. A prospective observational study was done in the General Medicine department of Almas Hospital for 6 months to analyze the prescribing pattern of drugs used in Diabetes mellitus with cardiovascular diseases. 154 patient prescription patterns were studied, out of which 56.5% were males and 43.5% were females. Most of the patients were in the age group of 41-64. Hypertension was the most commonly found co-morbid condition. Glimepiride+metformin were mostly prescribed during a hospital stay. Metformin was the commonly prescribed oral hypoglycemic agent. It was found that the majority of drugs were prescribed from the recent NLEM of India by the practitioners which indicates the implementation and adoption of national drug policy by the hospitals and cardiologists

Keywords: T2DM in Cardiovascular Disease, Comorbid T2DM with Cardiovascular Disease, Risk Factors, Duration of Diabetes with CVD.

INTRODUCTION

India is now the nation with the highest rate of diabetes in recent years [1, 2]. Diabetes is a significant and becoming more common independent risk factor for stroke and cardiovascular illnesses [3]. It has been estimated that 60–80% of those with diabetes will develop hypertension at some point [4]. It has been demonstrated that dyslipidemia raises the risk of coronary heart disease in diabetic people [3].

Ischemic heart disease (IHD), myocardial infarction, congestive heart failure, hypertension, and dyslipidemia are the most common chronic consequences of diabetes. These conditions require comprehensive medication therapy in addition to lifestyle changes.

Compared to diabetes itself, they place a far greater burden on diabetic patients and overall medical expenses [4, 5]. Analyzing the patterns of medicine prescriptions can provide valuable information on how diabetics are often treated for co-morbid illnesses with their medications. Understanding prescription patterns can help us utilize drugs more sensibly and motivate us to change our prescribing practices [2].

The goal of the current study was to examine the medication prescribing practice for type 2 diabetes mellitus's cardiovascular co-morbid diseases. To do this, we have determined the prevalence of IHD, hypertension, and dyslipidemia among patients with type 2 diabetes who visit our teaching hospital's outpatient department (OPD). Additionally, an effort was made to determine whether the quantity and composition of medicine prescriptions differed according to the management of diabetes.

This investigation was carried out in a tertiary care hospital's general medicine and cardiology outpatient departments. The Institutional Ethical Committee approved the study protocol. Sort 2 Participants in this study comprised diabetic individuals with a history of IHD, hypertension, or dyslipidemia who had been diagnosed with the disease for at least a year and who were between the ages of 30 and 75.

Considering the rising incidence of additional co-occurring medical problems, patients older than 75 years were not included. From June to December 2012, 100 diabetes patients met the requirements and had their medical records gathered from the OPD using a proforma to document patient demographics, diagnosis, blood glucose/glycosylated hemoglobin (HbA1C) levels, and prescription medications.

ETHICAL CONSIDERATION

The study title and protocol were approved by the institutional ethical committee. The study conducted after obtaining the institutional ethical committee clearance. The written informed consent form is taken from the patient after the patient is informed about the study orally. No interventions have done without interviewing the patients and collecting the information from the hospital case record.

Aims and Objectives

- ❖ The study aims to evaluate the prescribing pattern of drugs used in T2DM with cardiovascular diseases in a tertiary care hospital.
- ❖ To study the current prescribing pattern of drugs used in T2DM patients with cardiovascular diseases adopted by physicians.
- ❖ To access the risk factors in Type 2 DM with cardiovascular diseases

RESEARCH METHODOLOGY

A prospective observational study was done in the General Medicine department of Almas Hospital with sample size Not less than 154 patients. The study was conducted for 6 months to analyze the prescribing pattern of drugs used in Diabetes mellitus with cardiovascular diseases. Study materials are the Case collection form and informed consent form.

Estimate a proportion

$$n \geq \frac{Z^2_{1-\alpha/2} \times p(1-p)}{d^2}$$

(Cochran's equation):
Z = Level of significance (5%),P = Prevalence from reference article (S. Anandkumar *et al.,*) ,, d = Estimation error (0.07)

The sample size for the study was estimated based on the proportion of 27.2% as a primary outcome and it's expected that 5% level of significance and 7% margin of error.

STUDY CRITERIA

Inclusion Criteria

- Patients diagnosed with Diabetes Mellitus with Cardiovascular diseases
- Age group – 18 and above
- Those who give consent voluntarily to participate in the study.

Exclusion Criteria

- Pregnant women, including those with gestational diabetes.
- Lactating women

STUDY PROCEDURE

- A prospective observational study is planned to be conducted in the General Medicine department of a tertiary care teaching hospital.
- A written informed consent form will be obtained from the patient or caregiver after giving a brief introduction about thestudy.
- Patients diagnosed with diabetes and cardiovascular disease are identified by the inclusion and exclusion criteria.
- Data collection form will be used for recording the Demographic details, past medical and medication history, and reason for admission.
- Information about current drug treatment [i.e., generic and trade name, formulation, dose, frequency, category of drugs] will be collected.
- The collected data will be further analyzed based on aims and objective

STATISTICS

The collected data were numerically coded and descriptive statistical analysis was performed by using Microsoft Excel! ™ software and results were expressed as numerical variables and as percentage (%) for categorical variables. Descriptive statistical analyses were performed.

RESULT & DISCUSSION

According to results reveal that out of 154 patients recruited for the study, 56.5% of the patients were males and 43.5% of the patients were females. It was identified that a maximum number of patients were in the age group of 40-64 years (44.8%) followed by 40.9% of the patients in the age group of 65-74 years and 19% of the patients in the 75-84 years age group followed by 1.3% and 0.6% in age groups of 18-39 and >85 years respectively.

Table no. 1: Distribution of patients based on Gender

Gender	study participants (n=154)	Percentage
Male	87	56.5%
Female	67	43.5%

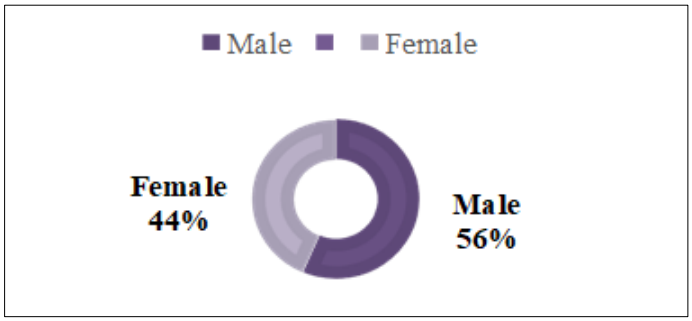

Fig.1: Distribution of patients based on Se

Table no. 2: Distribution of patients based on Family History

Family history	No of the study participants (n=154)	Percentage
No	138	90
Yes	16	10

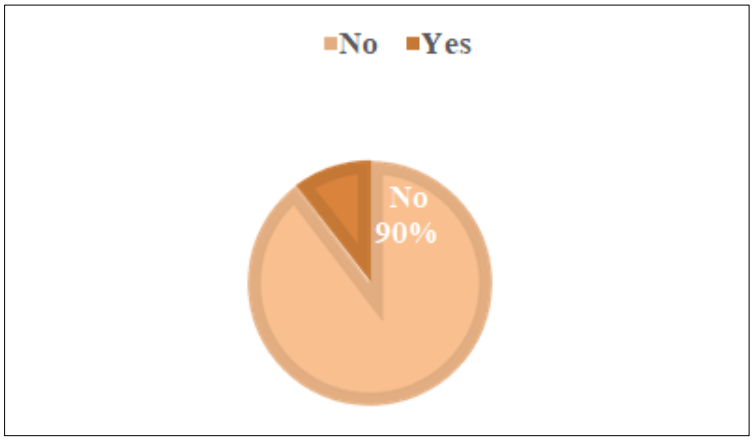

Fig. 2: Distribution of patients based on Family

Table No.3: Distribution of Oral Antidiabetic Medications

Oral Antidiabetic Medications	Frequency	%
METFORMIN	35	22.70%
GLICLAZIDE	1	0.60%
GLIMEPIRIDE	5	3.20%
DAPAGLIFLOZIN	11	7.10%
VOGLIBOSE	1	0.60%
VILDAGLIPTIN	2	1.30%
TENELIGLIPTIN	4	2.60%

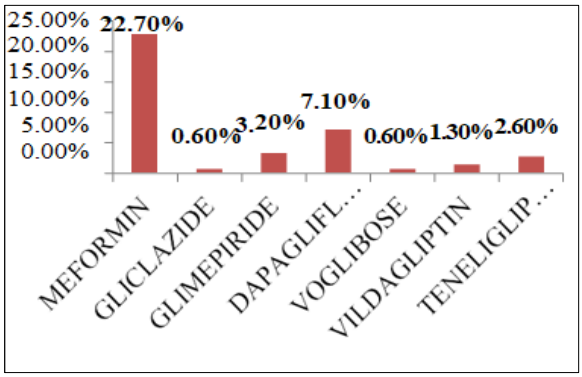

Fig.3: Distribution of Oral Antidiabetic drug

The oral antidiabetic drug metformin was the most commonly prescribed drug in the diabetes study population (22.70%), followed by dapagliflozin (7.10%), glimepiride (3.20%) and teneligliptin (2.6%) [Figure 7]. Human Actrapid (6.50%) and Human Mixtard (2.6%) we the most used insulin preparations [Figure 8]. Glimepiride+Metformin (33.1%) was the most used Combination drug, followed by glibenclamide+metformin (6.50%) and vildagliptin+metformin (1.3%) the least. [Figure 9].

Table no. 4: Distribution of Insulin preparations

Insulin Preparations	Frequency	%
ISOPHANE	3	1.90%
GLARGINE	1	0.60%
HUMAN ACTRAPID	10	6.50%
HUMAN MIXTARD	4	2.60%
TOTAL:	**18**	**11.6%**

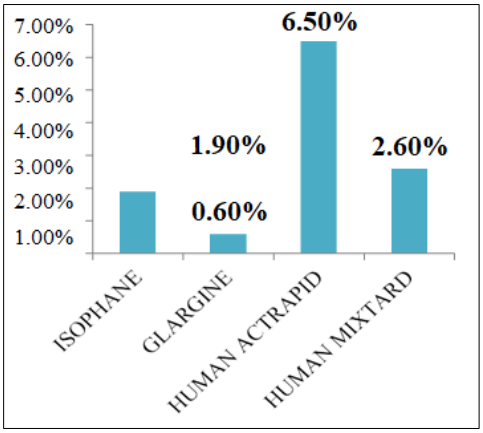

Fig.4: Distribution of Insulin preparation

Table no. 5: Distribution of patients based on Dual therapy

Dual therapy of T2DM	Frequency	Percentage
GLIMEPIRIDE + METFORMIN	51	33.1%
GLIBENCLAMIDE + METFORMIN	10	6.50%
VILDAGLIPTIN + METFORMIN	2	1.30%
ISOPHANE + HUMAN INSULIN	3	1.90%

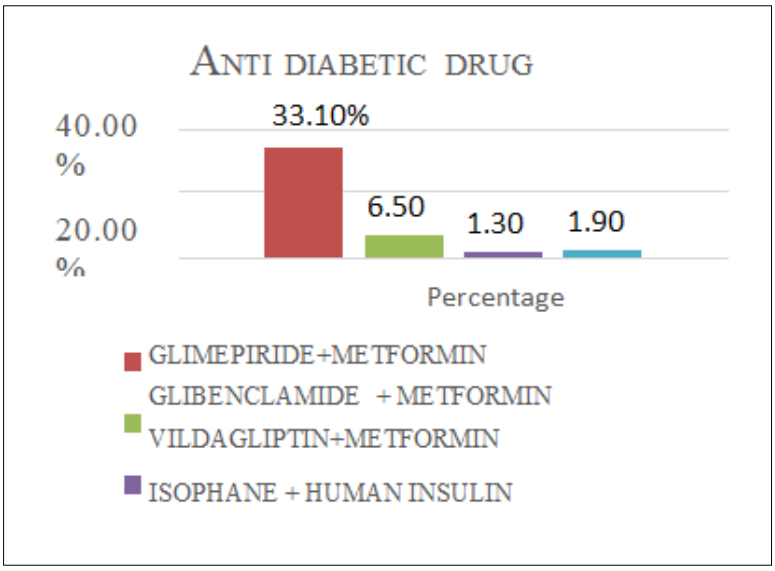

Fig.5: Distribution of patients based on Dual therapy

Table no. 6: Distribution of patients Antihypertensive Drugs

Antihypertensive Drugs	Frequency	Percentage
AMIODARONE	2	1.30%
ATENOLOL	2	1.30%
BISOPROLOL	5	3.20%
CILNIDIPINE	32	20.80%
CLONIDINE	3	1.90%
METOPROLOL	7	4.50%
NEBIVOLOL	24	15.60%
TELMISARTAN	23	14.90%
VERAPAMIL	1	0.60%

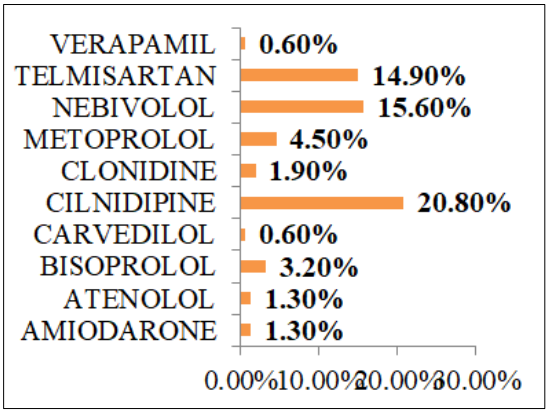

Fig. 6: Distribution of patients Antihypertensive Drugs

More use of calcium channel blockers and beta blockers was observed, followed by angiotensin 2 receptor 1 blockers. Cilnidipine (20.80%), nebivolol (15.60%) and telmisartan (14.90%) [Figure 6].

Table no. 7: Distribution of patients based on Antianginal drugs received

Antianginals drugs	Frequency	Percentage
NICORANDIL	4	2.60%
NITROGLYCERIN	12	7.80%
ISOSORBIDE DINITRATE	12	7.80%

In Antianginals, Nitrates (Nitroglycerin7.80%) and (Isosorbide Dinitrate 7.80%) were used the most by patients Diagnosed with cardiovascular Disease in T2DM patients followed by Potassium channel opener (Nicorandil 1.4%) [Figure 10]

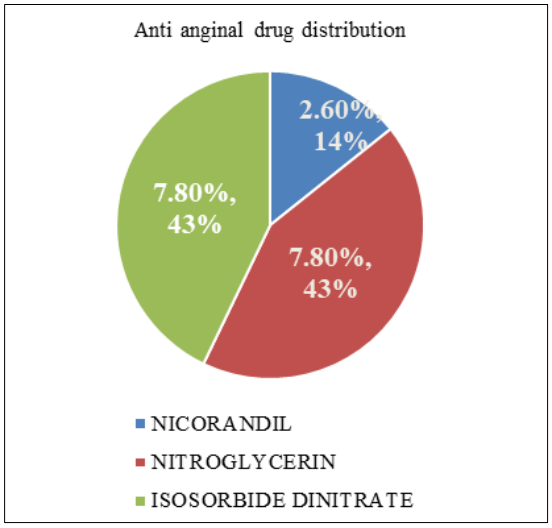

Fig.7: Distribution of patients based on Antianginal drugs received

Table no. 8: Distribution of other cardiovascular drugs

Other cardiovascular Medications		No. of study participant	Percentage
Antiarrhythmic agents	IVABRADINE	2	1.3%
	AMIODARONE	2	1.3%
Inotropic agent	ISOPRENALINE	1	0.6%
Anticoagulant	HEPARIN	110	71.4%
	ENOXAPARIN	1	0.6%
Antiplatelet	ASPIRIN	29	18.8%
	CLOPIDOGREL	15	9.7%
	TICAGRELOR	2	1.3%
Antilipidemic agent	ATORVASTATIN	123	79.69

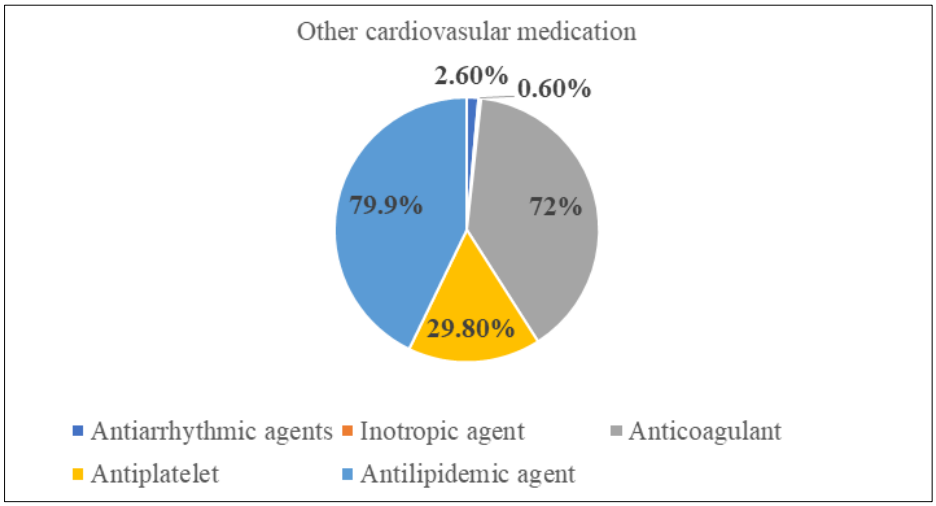

Fig.8: Distribution of other cardiovascular agents

Table no. 9: Distribution of dual therapy

Dual Therapy	No. of study participants	Percentage
FUROSEMIDE+SPIRANOLACTONE	4	2.6%
CILNIDIPINE+TELMISARTAN	3	1.90%
CLOPIDOGREL+ASPIRIN+ATORVASTATIN	25	16.2%
CLOPIDOGREL+ASPIRIN	95	61.7%
ROSUVASTATIN+ASPIRIN +CLOPIDOGREL	1	0.6%

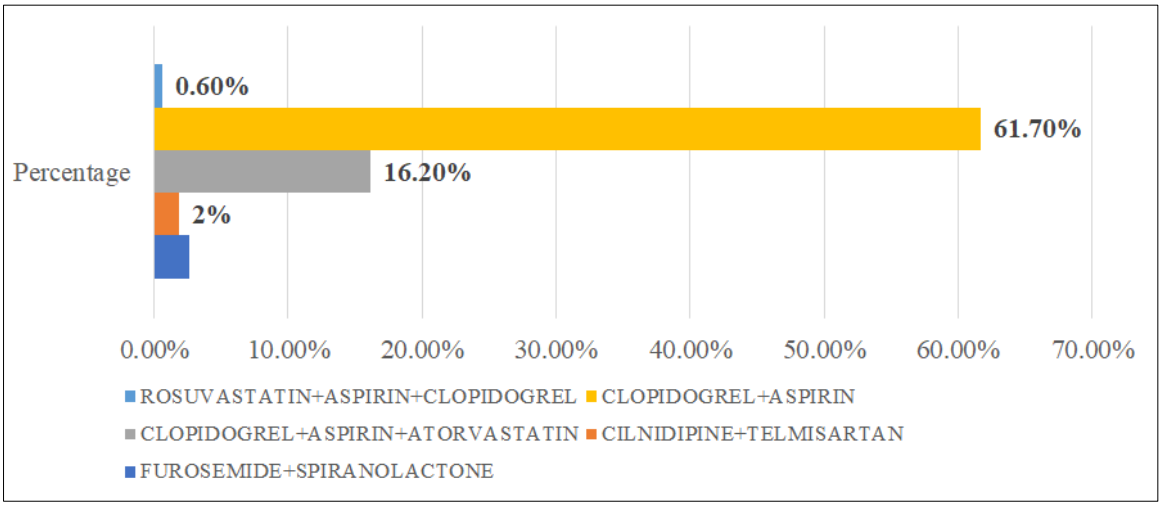

Fig 9: Distribution of dual antihypertensive drugs

DISCUSSION

According to the study, out of 154 patients, the majority were males (56.6%) within the age group of 40-64 years, while females constituted 43.5%. The study revealed that patients aged 40-64 years exhibited a higher frequency of Type 2 Diabetes Mellitus (T2DM) with cardiovascular diseases, followed by the 65-74 age group (senior). The most prevalent comorbidity observed was hypertension (HTN), affecting 64.3% of patients, followed by coronary artery disease (CAD) at 12.3%, and dyslipidemia (DLP) at 10.4%. Regarding antidiabetic medications, metformin was the most commonly prescribed agent, administered to 35 patients, constituting 22.70% of the cohort. Insulin therapy was followed with 18 patients (11.6%), while dapagliflozin was prescribed to 11 patients (7.10%), and glimepiride to 5 patients (3.24%). Among dual antidiabetic therapies, the most common combination observed was glimepiride + metformin, prescribed to 51 patients (33%). Other preferred combinations included glibenclamide + metformin and vildagliptin + metformin. In this study, a high prevalence of cardiovascular diseases was observed among patients, primarily coronary artery disease (CAD) affecting 94.8% of the cohort. Patients within the 40-64 age group were predominantly affected by hypertension (HTN)The prescribing prevalence of antihypertensive medications revealed cilnidipine as the most prescribed drug (20.80%), followed by nebivolol (15.60%), and telmisartan (14.90%). Metoprolol, bisoprolol, clonidine, amiodarone, and atenolol were also prescribed, with carvedilol and verapamil being the least prescribed drugs. For the management of CAD, anticoagulants (72%) and antiplatelets (29.8%) were frequently prescribed, along with statins (78.6%). Antiarrhythmics (2.3%) and antianginals (18.2%) were also used, albeit less frequently.

CONCLUSION

The findings of this study underscore the heightened health risks faced by individuals, particularly those with diabetes, where a notable increase in patient caseloads was observed. Advancing age was identified as a significant factor contributing to the higher incidence of cardiovascular illnesses among men compared to women within the Type 2 diabetes population. Hypertension (HTN) and coronary artery disease (CAD) were identified as the most prevalent co-morbidities, affecting 64.3% and 12.3% of patients, respectively, with CAD being the most diagnosed cardiovascular disease among Type 2 diabetes patients, followed by HTN. Metformin emerged as the frequently recommended medication for Type 2 diabetes treatment, with glimepiride being the preferred sulfonylurea. The combination of metformin + glimepiride was favored over metformin + glibenclamide, reflecting similar preferences among physicians. Newer medications such as DPP-4 inhibitors were also utilized in certain cases. In terms of cardiovascular medications, statins and anticoagulants were the most commonly prescribed. Among antihypertensive drugs, beta-blockers and calcium channel blockers were frequently administered. Nitroglycerin and isosorbide dinitrate were the preferred nitrates for treating CAD.

LIMITATIONS OF THE STUDY

1. Single-Centre Design
2. Limited Sample Size
3. Geographical Bias
4. Selection bias
5. Limited scope of variables
6. Cross-sectional design
7. External validity

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